THE COMMUNICATOR
SURREY AMATEUR RADIO CLUB

Volume II December 2008 Issue XXXIV

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SARC
Surrey Amateur Radio Club

ALWAYS MONITOR 147.36+ (110.9)
OR 443.775+ (110.9 in and out)

CLUB NET @ 8:00 P.M. Tuesday 147.36+ (110.9)
Thursday 144.250 USB 7:30 P.M.
CLUB MAILING ADDRESS : 239 -7156 121 St. Surrey, B.C. V3W 0J6

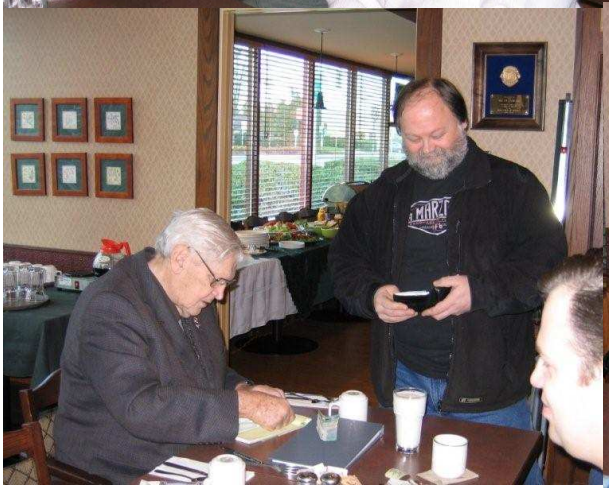
The next meeting of the Surrey Amateur Radio Club will be held on Wednesday January 7th 2009 at the Provincial Regional Emergency Operations Center (PREOC) located at 14275 96th Avenue Surrey V3T 4M5 - Enter off 96th Talk in on 147.36+ (110.9) 443.775+ (110.9)

As the December meeting was the annual Christmas brunch no formal minutes were taken. However everyone enjoyed well prepared food and camaraderie at the annual brunch.

The program for the January meeting will be a presentation by Sol Lancashire, VA7SOL on D-Star. Sol is an Engineer with BC Hydro and has been working with BCFMCA and D-Star since the early days. Sol has an in depth knowledge of the digital world and D-Star.

Don't miss this opportunity to gain a working knowledge of D-Star.

SARC MEMBERS GATHER TO CELEBRATE CHRISTMAS 2008 AND ENJOY SOME GREAT CAMARADERIE AND DELICIOUS FOOD




2008.12.13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MERRY*

***CHRISTMAS**

SARC goals for 2009

Come January there will be a serious effort to get various committees fully functioning. Committees include: membership, field day, health and welfare, governance, finance, swap meet, repeater, ham classes, member help and social. Each member who has agreed to serve on a committee will be asked to re-confirm his/her commitment to respective assignments and report to the membership on a regular basis.

SARC Basic licensing course

The Surrey Amateur Radio Club is offering a basic amateur radio licensing course in early January for full details contact:
President Mike Plant VE7AT
604-595-3598
Vice-President: John Brodie VA7XB
604-591-1825

North Shore ARC

The North Shore Amateur Radio club is offering the Basic Licensing course starting January 10. Seven Saturday mornings, 8am to 12:30 at the North Shore Emergency Management Office located in the RCMP building on 14th near Lions Gate Hospital. Course includes the Kolody study notes with Question Bank, Power Point slides, binder with current I.C regulations with other useful information, the exam and coffee. Cost is $120 cash or cheque. Some discounts available. Please visit www.nsarc.ca for more details.
Contact information or registration.
John White VA7JW Chief Instructor
va7jw@shaw.ca
tel 604-936-2367 cell 604-802-8367

Health and Welfare

Vic Medway, VE7CON is presently in Surrey Memorial Hospital. Vic is still waiting for a diagnosis of his ailment but he is in good spirits and can have visitors.

New RAC ARES Operations Training Manual

The recently introduced RAC ARES Operations Training Manual has met with widespread approval from the Amateur Radio community and is even being requested by Emcomm groups in other countries. Plans are that it will be printed in a handy and portable hard copy form early in 2009. The editor, RAC National Training Coordinator David Drinnan, VE9FK, is making further updates for inclusion in the manual.
Once published, the new training resource will be offered for sale on the RAC On-Line Store. It will continue to be available for downloading, free of charge, at
<http://www.rac.ca/fieldorg/ACARESTrainingManual.htm> .

R.D. (Bob) Cooke VE3BDB
RAC Vice President for Field Services

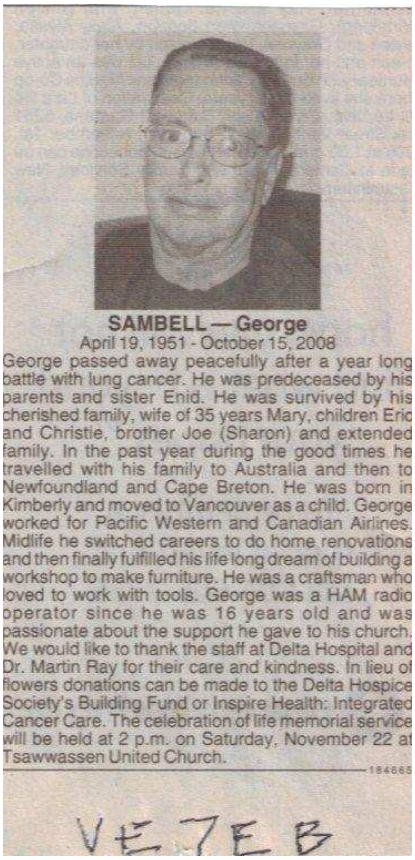
George Sambell, VE7EB

Silent key

Those who worked the many public service events with George will know how much he will be missed.

Ken Clarke, VE7UQ, and I attended Georges service

Fred VE7IO



SAMBELL — George
April 19, 1951 - October 15, 2008
George passed away peacefully after a year long battle with lung cancer. He was predeceased by his parents and sister Enid. He was survived by his cherished family, wife of 35 years Mary, children Eric and Christie, brother Joe (Sharon) and extended family. In the past year during the good times he travelled with his family to Australia and then to Newfoundland and Cape Breton. He was born in Kimberly and moved to Vancouver as a child. George worked for Pacific Western and Canadian Airlines. Midlife he switched careers to do home renovations and then finally fulfilled his life long dream of building a workshop to make furniture. He was a craftsman who loved to work with tools. George was a HAM radio operator since he was 16 years old and was passionate about the support he gave to his church. We would like to thank the staff at Delta Hospital and Dr. Martin Ray for their care and kindness. In lieu of flowers donations can be made to the Delta Hospice Society's Building Fund or Inspire Health: Integrated Cancer Care. The celebration of life memorial service will be held at 2 p.m. on Saturday, November 22 at Tsawwassen United Church.
184663

VE7EB

with Gary Skett, VE7AS

Thank you for all the positive feedback so far. I'm pleased that my ramblings have been of some benefit. However, some Hams seem have missed the last suggestion, so I will try and rephrase. If you have an electrically balanced antenna up in the air for any band above 10 Megahertz, how are you going to get it connected to ground anyway? A quarter wavelength for 10 MHz. is about 23 feet long. Soooooo, 23 feet away from ground is an infinitely high impedance. At half that distance the AC impedance is in the hundreds of Ohms.

Some say they want to install a ground system as a cure for television interference or TVI. I say, how do you think an RF ground will help this? If you have a nice resonant antenna on 28 MHz, and it's up at some decent height in the air, its second harmonic is still at 56 mhz., right in the middle of channel 2 television! Rather than putting in a ground system, install a high quality Low Pass Filter on the output of your transmitter. Let the neighbours put a high quality High Pass Filter on their antenna connections to their TV set, and forget about it!

Now, if you are a 160 Metre fan, well, maybe you should install a good RF ground. So, that's one band, 200 KHz. wide, in 23,471 MHz. of Ham spectrum. In other words 0.85 of 1% of that spectrum. Less than one percent of a reason to lend to the motivation for installing a good RF ground.

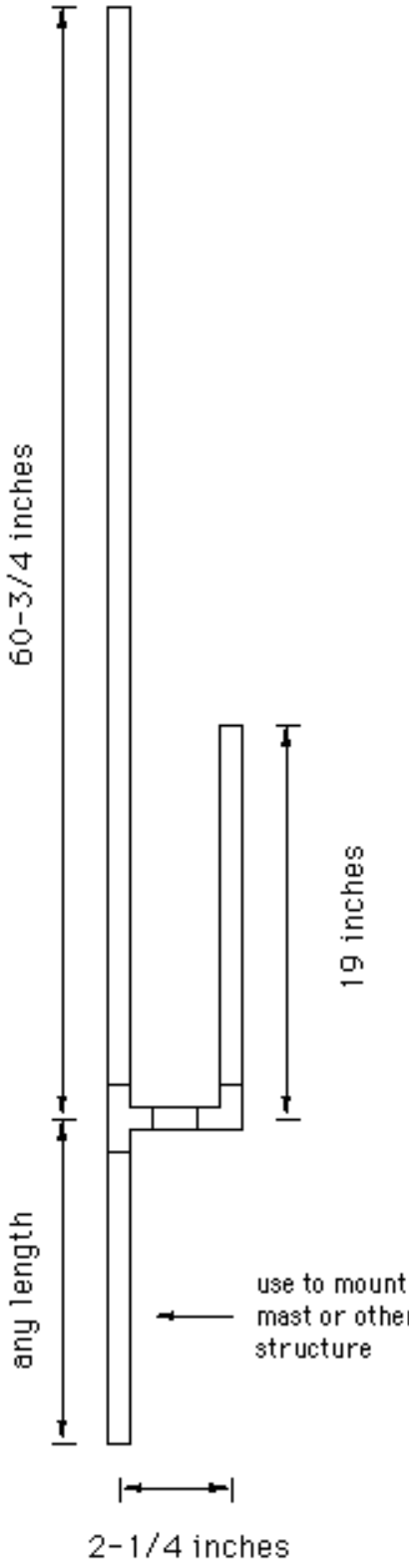
Don't get me wrong, a ground system can be a good thing. But, think about why you want to install one, and will it do your station any good?

Enough about that, this instalment will cover one VHF antenna and some discussion on feedlines. I was going to get you to look at the simple 1/4λ ground plane for 2 metres…..but how ho-hum! Every Ham should already know how to build a 1/4λ with #10 solid copper and a SO-239 coax connector. And who wants a unity-gain antenna on VHF anyway? Gee, how boringly conventional. So, let's build a dual band "Copper Cactus" J-Pole with at least 2.5db of gain over a 1/4λ. Whoopee Gain!

The Copper Cactus J-Pole can be made for under $25…depending on where you shop and what you have.

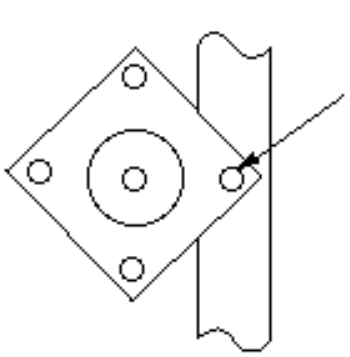
The Copper Cactus J-Pole

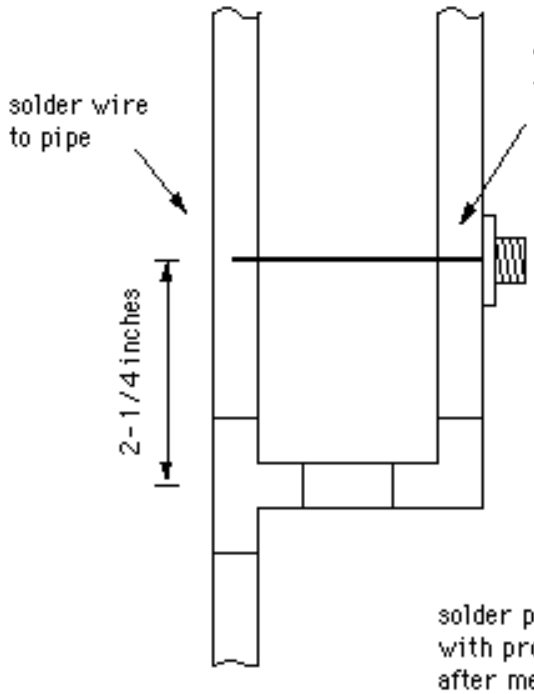
2 meter / 70 cm dual-band antenna



Materials List

10 ft section of 1/2" copper water pipe
copper pipe "T" connector
copper pipe 90° "Elbow" connector
N, BNC, or SO-239 chassis mount with teflon dielectric
2-1/2" piece of no. 12 wire
1/8" self tapping screw or pop rivet





solder pipe together
with propane torch
after measuring carefully

"73 Amateur Radio Today"
February 1992

The diagram clearly indicates the measurements – please be exact, as any deviation from these measurements will alter the resonant frequency and will affect the SWR [Standing Wave Ratio] Note, changing the 2¼" dimension for your feed point, will do little for the resonant frequency and only worsen your SWR. Trust the dimensions…someone smarter than us has done this already ☺ I will show you a trick though to fine tune your J-pole, after you finish with this design.

CONSTRUCTION HINTS: Use a handheld pipe cutter for nice even [straight] cuts, buy the best quality Teflon dielectric SO-239 you can afford – which means stay away from MODE products. Less expensive connectors will burn, melt, or swell while it waits for you to finish cooking the solder around it. I strongly suggest using steel wool, or a brass or copper brush/wheel to polish the contact points and use some Solder Flux or paste. This will raise your success rate.

I found using a 20 foot length of copper conduit for the "any length" part of the antenna not really cost effective, nor particularly rigid. AND a new threat….it's c-o-p-p-e-r and it gets stolen these days…So, I substituted a piece of ¾" EMT for the mast material via a ½" to ¾" adapter and riveted it into place. Then, I painted it all a nice Evergreen Tree Green, to hide the copper colour, weatherproof connections, and make it blend into the skyline, at least during the growing season… I used Rustolem™ spray paint, and it did not [appear to] have any measurable affect on the operation of the J-Pole.

Oh, this diagram didn't include some ½" copper caps on the two elements…don't forget to add these to your material list. You'll need two – soldered into place.

TESTING: OK, it's all put together, mounted on a test mast, painted and ready to put it into the air….you can "feel" the RF signals just soaking the outer molecules of the J-Pole….the hairs on your arm are tingling…is it even resonating in the Ham Band?

Connect an odd multiple of a wavelength [at 145.95 MHz.] of cable to the antenna, secure it on a saw horse or chair and put it outside away from things…or put it into the air, if you're set up for it….attach your antenna analyser or miniVNA to the cable and take some measurements.

Where did yours resonate at? My dip happened at [145.995 MHz.] @ 1.15:1 SWR, better than I expected. That's with 5 turns at 5 inches diameter of coax about a 12-16 inches from the feed point. With a 1.5:1 SWR Bandwidth of 144.140 to 147.600MHz., makes it fine for the entire 2 metre band.

I discovered that you can move the resonant frequency a few KHz. by using less or more turns and taping it closer or farther away from the feed point. The SWR changes as well, no position outside the 12-16 inches below the feed point improved the SWR [lower than 1.15:1]

This antenna is to be for my APRS station, so I would have preferred a lower resonant frequency, which meant longer elements…but it's pretty much a guess as to what length will produce what result – remember, antenna making is a black art, not so much a science…so what can I do? To add length I drilled and tapped the end cap on the 1/4λ stub for a 1" brass ¼ by 20 machine screw. I managed to get the resonant point down to 144.370 @ 1.2:1 SWR. As my wonderful wife would say, "It's not *just* good… It's *good enough*!"

So you can boast to your lazy friends who "bought" their antenna, here are the tech-notes behind the J-Pole antenna. This is an omni directional antenna that can be used for base, mobile and field day stations. It *does not* need a ground plane, radials or a complicated matching system. The J-Pole can be cheaply, simply and quickly constructed using a variety of techniques, one of which have been discussed here.

THEORY: The J-Pole antenna consists of a half-wavelength radiator fed by a quarter-wave matching stub. Effectively, the antenna is an end fed dipole. The antenna has an omni directional pattern with a low take-off angle. The quarter-wave stub is a transformer that provides a means of transforming the high impedance of the antenna to that of the transmission line. In this configuration you will get "gain." On average 2.1 to maybe 3 db over a simple 1/4λ ground plane.

There are two common configurations of the J-Pole antenna: an open-stub version [like the TV twin-lead j-pole] and a shorted-stub version [like the copper cactus design].

According to the ARRL Antenna Book the open-stub version, can be connected directly to low-impedance 50 ohm coax lines with good results; however, the lack of a movable balun allowing impedance adjustment may make this version of the antenna difficult to adjust for minimum SWR. Alternatively, the shorted-stub version, featured in this article, which is usually fed with 200-600 ohm open-wire line, or 50 ohm coax cable using a 4:1 balun, allows easy adjustment for minimum SWR. The ARRL Antenna Book does not recommend feeding the shorted-stub version directly with 50 ohm coax, citing less than optimum results, a lack of reproducibility and heavy coupling with nearby objects. Despite this, many J-Pole antenna designs are based on feeding the shorted-stub version directly with 50 ohm coax – just don't expect a 1:1 SWR and do expect some RF coming back along the feedline.

To help adapt your J-Pole to use coax cable make a choke wound from four to six turns of coax cable with a diameter of 125mm [5"]. Alternatively, depending on the type of coax cable used, a ferrite bead balun or other current type balun could be used. One suggestion is to use a 50-ferrite-bead (FB-73-2401) sleeve-over-coax balun (a W2DU type balun) taped to the base of the antenna.

Dr. John S. (Jack) Belrose, VE2CV has been interested in J-Pole antennas for many years, and has written extensively about them. He particularly noted that the diameter of the radiating element affects the bandwidth and the physical length required for a given operating frequency.

As the diameter of the radiating element is increased, the useable bandwidth increases and the physical length of the radiating element required for a given operating frequency decreases with respect to the free space half-wavelength. Thus, by using a larger diameter radiating element a larger bandwidth can be realised with a physically smaller antenna. In reality this is a velocity factor effect. This effect is described at length in a theoretical sense in the ARRL Antenna Book. VE2CV has empirically determined the relationship between the antenna diameter and the physical length, and the dimensions of the J-Pole antenna can be calculated using his measurements.

Weatherproofing: Outside installations for prolonged periods of time need the joints and the coax cable connections to be weatherproofed. Use a neutral cure [one that doesn't smell like vinegar] sealant to prevent water ingress and corrosion. Or use non-metallic spray paint to seal it – you can camouflage your antenna by painting it to match the skyline, roof and house colour. Be sure to wrap or seal your connector.

Mounting the Antenna: The antenna may be fastened to any supporting structure including grounded metal. Ideally, the antenna should be mounted at least a quarter-wavelength above any metal structures.

I didn't have any LMR400 to feed it with – as I would recommend to others, and with the length from my transceiver to the installation point well under 100 feet, I fed it with my standard "use everywhere" coax [except UHF & higher] – LMR240. Before LMR cable, I used RG-8X. Today, LMR240 is my transmission line of choice. If you shop around, you can get it for around $320 for a 1000' spool of an Asian brand, to as much at $789 for an American name brand coax. Buyer beware here, as some, not all, but some off shore coax has some flaws, like not exactly the right outer dimension [crimp connectors don't fit], not exactly 50 ohms, will not take high power or tolerate high SWR points. [the dielectric melts or the cable will burst into flames!] Braid coverage could be substantially less than desired. Remember, if the price is really, really, really, good…the cable may not be!

So there you have it, your first practical antenna….oh yes it does radiate in the 440MHz. Ham band. SWR will be the pits, but it works – put away your antenna analyser and SWR meter and just enjoy your UHF QSO.

So what kind of cable do you use? There are many cables to chose from – balanced and unbalanced – single, double or triple shield, practically no shield – 50, 52, 63, 75, 300, 450, 600 Ohms impedance? Mini coax, flexible [stranded vs. solid core], semi-rigid, rigid, direct-burial, with or without a carrier cable, FT4 or FT6 jacket; Belden, Amphenol, LMR, DMX, No-name brand? It's all such a mystery – and there is a huge range of prices and quality.

So what do you buy and does it make that much of a difference? What you buy is totally up to you and your particular antenna. Just remember that because your transceiver needs to see a 50 Ohm load, doesn't necessarily mean you have to use a 50 ohm coax A-F-T-E-R your antenna tuner. Will it make a difference? Depends… How much power to you really need to trip up the Club's repeater? Pico or Nano watts can produce a full quieting signal, so if you feed your 50 watt transceiver with 500 feet of RG174 mini coax and lose 50db in your feed line, you'll still get into the repeater. On the HF bands, one S unit is roughly equivalent to 2 db of [real] signal strength. At what level is it too low to hear anything? Is the money spent to signal attenuation ratio a practical consideration? If you *must* extract or inject the absolute maximum energy, then you *must* spend the maximum dollars…yet will you get more DX QSOs than anyone else, just because of the feedline used? Did your custom fitted, CNC balanced, ultra contoured grips on your titanium/fibre glass golf clubs make you a better golfer? If you think so, then that's all that counts…

But there are a few questions you need to ask yourself before you go and order a 1000 foot spool of cable…Not necessarily in the following order;

1) *What kind of antenna is it being used for?* A Dipole, ground plane, vertical, yagi, or some experimental antenna. Is the antenna feed point designed to match 50 ohm coax cable, or open wire?
2) *What power level am I going to use?* Are you using QRP, 100-200 watt standard Ham rig? Or 1000 Watts? Very low power requires low-loss cable, 1000 watts requires a larger [thicker] cable and a properly matched antenna to avoid cable "Hot Spots."
3) *How long is the cable run?* Every measurement is based on loss or attenuation for every 100 feet of cable. The longer the run, the more the need for a low loss [larger] cable – see paragraph above.
4) *Is it going to a stationary antenna, or one on a rotor?* If it's going to a yagi on a rotor, semi-rigid or rigid cable isn't what you want to use if you can't afford a remote antenna switch feed with LMR600 to the switch, and RG213 for the rotor section.
5) *How much do I spend on cable?* Be prepared to spend a fair chunk of your antenna budget on cable and [good] connectors. Spending $1500 on a multi-element, multi-band yagi and then

feeding it with some cheap off-shore "clone" connector and cable is a total waste – you would easily lose what gain you have in the antenna through cheap coax and connectors.

Here are a few charts to mull over…let your emotional mind chose and your practical mind [and pocket book] buy the right cable… ☺

Coax Cable Signal Loss (Attenuation) in dB per 100ft*										
Loss*	RG-174	RG-58	RG-8X	RG-213	LMR200	LMR240	LMR400	LMR600	Belden 9914	Belden 9913
1MHz	1.9dB	0.4dB	0.5dB	0.2dB	1.1db	0.9db	0.2db	.012db	0.3dB	0.2dB
10MHz	3.3dB	1.4dB	1.0dB	0.6dB	1.8db	1.3db	0.4db	0.3db	0.5dB	0.4dB
50MHz	6.6dB	3.3dB	2.5dB	1.6dB	2.3db	1.7db	0.7db	0.55db	1.1dB	0.9dB
100MHz	8.9dB	4.9dB	3.6dB	2.2dB	4.0db	3.0db	1.5db	1.0db	1.5dB	1.4dB
200MHz	11.9dB	7.3dB	5.4dB	3.3dB	4.8db	3.7db	1.9db	1.2db	2.0dB	1.8dB
400MHz	17.3 B	11.2dB	7.9dB	4.8dB	7.0db	5.3db	2.7db	1.7db	2.9dB	2.6dB
700MHz	26.0dB	16.9dB	11.0dB	6.6dB	8.5db	6.5db	3.3db	2.1db	3.8dB	3.6dB
900MHz	27.9 B	20.1dB	12.6dB	7.7dB	9.9db	7.6db	3.9db	2.5db	4.9dB	4.2dB
1GHz	32.0dB	21.5dB	13.5dB	8.3dB	12.9db	9.9db	5.1db	3.3db	5.3dB	4.5dB
Z	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm	50ohm

* **Note:** Coax losses shown above are for 100 feet lengths. Loss is a length multiplier, so a 200 ft length would have twice the loss shown above and a 50 ft length would have half the loss. This multiplier factor is why you should keep cable installation lengths between radios and antennas as short as practical!

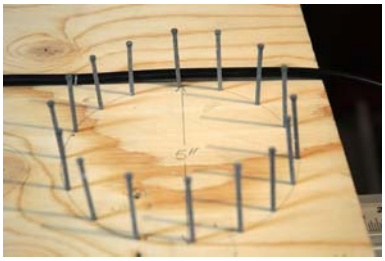
Power Capacity (In watts)								
MHz. >	30	50	150	220	450	900	1500	2000
Beldon 9913	2200	1700	900		450	280	200	160
LMR-100A	230	180	100	80	60	40	30	25
LMR-200	1020	790	450	370	260	180	140	120
LMR-240	1490	1150	660	540	380	260	200	170
LMR-240 Ultra	1490	1150	660	540	380	260	200	170
LMR-400	2100	1700	1000	830	550	380	290	250
LMR-400 Ultra	2100	1700	1000	830	550	380	290	250
RG-213	1800	1200	620		300			
RG-214	1800	1200	620		300			
RG-58U	400	300	160		80			
RG-8X	350	280	150		80			

Aerial Addendum

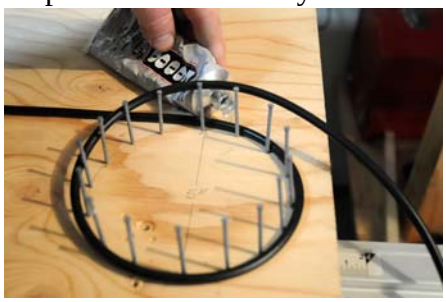
with Gary Skett, VE7AS

It had occurred to me that when I mentioned 4-6 coils of coax for your RF choke for your J-pole, that some of you may not have done this before. Here is how I form perfect...ok, near perfect coils.

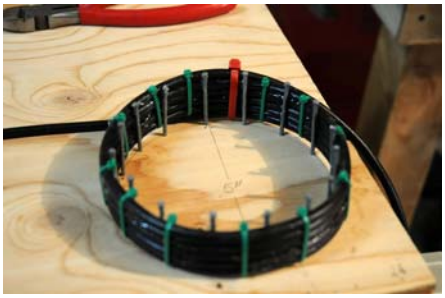
Step 1 – Get a piece of plywood and draw [with a compass] a circle the required diameter. For this project, we needed 5 inches. Then nail within that circle an appropriate number of finishing nails to make a good form. The more nails, the smoother [rounder] the loop.



Step 2 – Start to form your coils with your chosen coax and use an adhesive [generously] along the top edge as you wind. I use E6000, a great sealant/adhesive available at Industrial Plastics or PlasticWorks. Oh, leave about 2 feet [disappears to the left in the picture] before you start your coil. Keep the cable tight to the nails and apply glue to each layer as you wide.



Step 3 – Once you have laid down, say 5 turns, you can secure them into place with clamps, as illustrated…. Or you can you can use cable ties for a more secure method if you are uncertain about the integrity of the adhesive you were using. The red cable tie is the beginning and the end of the coil form. This will ensure your choke will lie uniformly underneath your J-pole. For my choke I wound 5 turns of my LMR240 around my nail form. Step 4 – When dry/cured [the next day] I carefully pried the coil off the nail form, crimped on a connector to the 2ft. pigtail and attached it with cable ties to my J-pole. [Coloured ties were used so they'd be seen in the photo, otherwise black UV resistant ties are the norm.]



The nail form is great for any size loop, with any cable – even soft copper tubing for DDRR antennas, and other projects requiring a coil. You can wrap the coil with tape if you wish, but I've found the E6000 with cable ties last for a long time. If you want to know how much cable was used for your choke? It's PI x the diameter x the number of coils. ((3.1415926 x 5) x 5) = 78.54 inches or about 6 ½ feet.